NOTES

1 It is considered good practice to relieve the camera aperture plate above and below the picture area to allow a clearance for film transport and minimize the possibility of film pinching. Dimension F specifies the amount of recess for this purpose.

2 Surfaces 1, 2, and 3, shown to establish the zero plane for purposes of measurement of the cartridge pressure pad film surface flatness, are circles having a diameter of 0.060 in (1.52 mm). The actual camera aperture plate bosses may deviate from this shape and size.

3 It is intended that the film surface of the cartridge pressure pad be flat, or be molded as a flat plane. Pits or depressions, however, which do not interfere with the film flatness are acceptable. Tolerances for the flatness on the cartridge pressure pad film surface are specified to account for slight warpage in molding if the pressure pad is made from a plastic material.

4 Relief in the pad surface equal to the sound stripe thickness may be provided beneath those areas of the film which are striped by adding material to the backing of the film.

Annex A (informative)
Bibliography

ANSI/SMPTE 166-1988, Motion-Picture Film (8-mm Type S) — Sound and Silent Camera Cartridge Notches — Exposure Control and Stock Identification

ANSI/SMPTE 198-1992, Motion-Picture Film (8-mm Type S) — 50-Ft Model 1 Sound Camera Cartridge — Aperture, Pressure Pad and Film Position

ANSI/SMPTE 200M-1988, Motion-Picture Equipment (8-mm Type S) — Model 1 Camera Cartridge — Camera Run Length, Perforation Cutout and End-of-Run Notch

SMPTE RECOMMENDED PRACTICE

RP 78-1992
Revision of RP 78-1983

Specifications for Azimuth Test Film for 16-mm Audio Projectors, Magnetic Type

1 Scope

This practice specifies a test film for use in aligning the azimuth of magnetic head gaps in 16-mm motion-picture audio projectors operating at approximately 36 ft (11 m) per minute.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this practice. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this practice are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

ANSI S4.3-1982 (R1992), Method for Measurement of Weighted Peak Flutter of Sound Recording and Reproducing Equipment

ANSI S4.6-1982, Method of Measuring Recorded Flux of Magnetic Sound Records at Medium Wavelengths

ANSI/SMPTE 97-1989, Motion-Picture Film (16-mm) — 200-Mil Edge-Position Magnetic Audio Record

ANSI/SMPTE 109-1986, Motion-Picture Film (16-mm) — Perforated 1R

ANSI/SMPTE 223M-1991, Motion-Picture Film — Safety Film

3 Test film signal

3.1 Frequency

The audio record shall be an original recording which will reproduce at a frequency of 7000 Hz ± 100 Hz when the linear speed of the film is 24 perforations per second or approximately 36 ft per minute (7.2 in or 183 mm per second).

3.2 Distortion

The total harmonic distortion of the recorded signals shall not exceed 0.5%.

3.3 Audio record

The audio record shall be recorded so that it extends from the perforations on one side of the film to the opposite edge, or from one edge of the film to the other.

3.4 Recorded level

The azimuth test tone shall not be more than 10 dB down from the equivalent reference level of 400 Hz at 185 nanowebers per meter after correct equalization of 70 μs.

3.5 Flutter

The weighted peak flutter of the audio record shall not exceed ± 0.1% when measured in accordance with ANSI S4.3.

3.6 Azimuth

The azimuth of the audio record shall be 90° ± 3′ to the reference edge of the film.

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4 Film stock

4.1 The film stock shall be full-coat, splice-free, and of the low-shrinkage, safety type in compliance with ANSI/SMPTE 223M.

4.2 Test films shall be made on a base cut and perforated in accordance with short-pitch dimensions specified in ANSI/SMPTE 109.

4.3 The film stock shall be conditioned for 10 days at 20°C ± 3°C (68°F ± 5.4°F) at a relative humidity of (50 ± 10)% prior to recording.

4.4 The film shall be recorded and packaged within the temperature and humidity limits specified in 4.3. The recorded film shall be packaged in a metal can and sealed either with a low-moisture permeability plastic tape or a fabric tape having a moisture barrier.

5 Identification

Each test film shall be identified by a suitable identification marking.

6 Calibration

6.1 Flux

The short circuit flux shall be determined by means of the calibrated short-gap ferromagnetic core reproducer technique. This technique is described in ANSI S4.6.

6.2 Level

The signal level specified in 3.4 shall be measured with an rms voltmeter calibrated in decibels with an accuracy of ± 0.1 dB over the bandwidth 31.5 Hz to 16 kHz.

6.3 Reproducing head

The test film shall be calibrated on a reproducing head made in accordance with ANSI/SMPTE 97.

NOTE – A test film made in accordance with this practice is available from the Society of Motion Picture and Television Engineers.

SMPTE RECOMMENDED PRACTICE

RP 128-1992
Revision of RP 128-1985

Specifications for Audio Level and Multifrequency Test Film for 70-mm Striped Six-Track Release Print Audio Reproducers, Magnetic Type

1 Scope

This practice specifies an audio frequency test film to be used for adjusting the sensitivity and frequency response of 70-mm striped six-track motion-picture magnetic audio reproducers intended for release prints operating at 120 perforations per second or approximately 112 ft (34 m) per minute.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this practice. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this practice are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

ANSI S4.3-1982 (R1992), Method for Measurement of Weighted Peak Flutter of Sound Recording and Reproducing Equipment

ANSI S4.6-1982, Method of Measuring Recorded Flux of Magnetic Sound Records at Medium Wavelengths

ANSI/SMPTE 119-1988, Motion-Picture Film (70-mm) — Perforated 65-mm, KS-1870

ANSI/SMPTE 185-1987, Motion-Picture Film (70-mm) — Position, Dimensions and Reproducing Speed — Six Magnetic Records on Release Prints

ANSI/SMPTE 223M-1991, Motion-Picture Film — Safety Film

3 Test film signal

3.1 Frequencies

The audio record on the film shall be a recording which will reproduce at the frequencies specified in clause 4 when the linear speed of the film is 120 perforations per second or approximately 112 ft (34 m) per minute (22.4 in [56.9 cm] per second).

3.2 Distortion

The total harmonic distortion of the recorded reference signal shall not exceed 0.2%. (See 6.1.)

3.3 Audio record

The audio record shall be recorded in accordance with ANSI/SMPTE 185.

3.4 Signal fluctuations

The signal levels shall not fluctuate more than ± 0.5 dB within each test section length.

3.5 Flutter

The weighted peak flutter of the audio record shall not exceed ± 0.04% when measured in accordance with ANSI S4.3.

3.6 Azimuth

The azimuth of the audio records shall be 90° ± 3' to the reference edge of the film.

3.7 Signal identification

Each test section and segment shall be preceded by voice announcements identifying the content at a level

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whose peak value does not exceed the peak level of the frequency series.

4 Film stock

4.1 The film stock shall be splice-free and of the low-shrinkage, safety type in compliance with ANSI/SMPTE 223M, and striped in accordance with ANSI/SMPTE 185, unless full-coat stock is used.

4.1.1 Test films shall be made on a base cut and perforated in accordance with dimensions specified in ANSI/SMPTE 119. Test materials made on acetate shall be clearly marked with a usage date.

4.2 The film stock shall be conditioned for 10 days at 20°C ± 3°C (68°F ± 5.4°F) at a relative humidity of (50 ± 10)% prior to recording.

4.3 The film shall be recorded and packaged within the temperature and humidity limits specified in 4.2. The recorded film shall be packaged in a metal can and sealed either with a low-moisture permeability plastic tape or a fabric tape having a moisture barrier.

5 Identification

Each test film shall be suitably identified to include the date of manufacture.

6 Test section

6.1 Reference level

A sine wave with a frequency of 1000 Hz ± 2% shall be recorded ahead of the azimuth section, having an absolute short circuit recorded level of 185 nWb/m ± 10 nWb/m for a duration of approximately 30 seconds.

6.2 Azimuth

A frequency of 16 kHz ± 2% shall be recorded ahead of the pink noise section having an absolute short circuit recorded level of 25.86 nWb/m ± 10 nWb/m for a duration of approximately 30 seconds.

6.3 Pink noise

The pink noise test signal used for this section shall have equal energy in equal logarithmic frequency intervals within the audio bandwidth. The lower limit shall correspond to the lower bandwidth of a 31.5 Hz-octave band filter of the ANSI class II type, and the upper limit to the upper bandwidth of a 16 kHz-octave band filter of the ANSI class II type. (Test bandwidths must be within these limits). The level in each one-third octave band from 40 Hz to 12.5 kHz shall be the same within ± 1 dB. The pink noise signal shall be recorded so that there shall be a low statistical probability of the extreme peaks within the signal saturating the magnetic film. The peak level of the wide band pink noise spectrum shall be essentially equal to that of the corresponding frequency response test segments. The recorded pink noise shall have the characteristic specified in 6.5 and a duration of approximately 30 seconds. (The pink noise test may also be used for multitrack azimuth adjustment using an oscilloscope lissajous figure from the two outside prime tracks of multitrack equipment.)

6.4 Frequency response

The 1000-Hz frequencies of this multifrequency section shall be recorded 6 dB below (92.50 nWb/m) the 185 nWb/m reference. The following test segment frequencies in hertz ± 2% shall be sine waves recorded in the order given:

1000, 31.5, 40, 63, 125, 250, 500, 1000, 2000, 4000, 6300, 8000, 10 000, 12 500, 14 000, 16 000, 1000.

6.5 Recorded levels

With a constant-amplitude sine-wave signal applied to the input of the recording system, the relative characteristic in effective values of the short circuit magnetic flux versus frequency shall decrease with increasing frequency proportionately to the impedance of a parallel combination of a capacitance and a resistance having a time constant of $\tau = 35$ μs and 3180 μs. (A time constant is a shorthand notation, such as illustrated by a frequency response curve, having a shape which results from a time constant of one or more microseconds. This is a convenient way of defining a response curve and is never intended as a recommended electrical circuit.)

The characteristic defined above is obtained by the following calculation:

$$L_\Phi = C_o - 10 \log_{10} \left(\frac{1 + (2\pi\tau_h)^2 f^2}{1 + 1/[(2\pi\tau_l)^2 f^2]} \right)$$

where L_Φ is the recorded relative short circuit magnetic flux level in decibels, f is the frequency in hertz for which L_Φ is computed, τ_l is a time constant of 3180 μs, τ_h is a time constant of 35 μs, and C_o is a constant with a value of 0.194 calculated to make $L_\Phi = 0$ at the reference frequency of 1000 Hz. The approximate numerical values are given in table 1.

Table 1 - Flux levels versus frequency in nanowebers per meter and decibels

Frequency, Hz f	Short circuit flux* nWb/m	Relative level † L_Φ
1000	92.50	0
31.5	177.68	+ 5.67
40	133.86	+ 4.29
63	120.82	+ 2.32
125	101.89	+ 0.84
250	96.30	+ 0.35
500	94.55	+ 0.19
1000	92.50	0
2000	86.62	− 0.57
4000	71.06	− 2.29
6300	55.35	− 4.46
8000	46.73	− 5.93
10 000	39.14	− 7.47
12 500	32.33	− 9.13
14 000	29.22	−10.01
16 000	25.86	−11.07
1000	92.50	0

* Calculated using the equation $\Phi = 92.50 \times \text{antilog}_{10}(L_\Phi/20)$.

† Calculated using the equation given in 6.5

6.6 Flux level variation

The film flux level at each frequency from 31.5 Hz through 16 kHz shall be within ± 0.5 dB of the value specified in 6.5. (See table 1.)

6.7 Duration

The duration of frequency response test segments shall be approximately 10 seconds, except for the 16-kHz tone which shall be approximately 30 seconds for azimuth and high-frequency equalization adjustments.

7 Calibration

7.1 Flux

The short circuit flux on the test film shall be determined by means of the calibrated short-gap ferromagnetic core reproducer technique. This technique is described in ANSI S4.6-1982.

7.2 Level

The signal level specified in 3.4 shall be measured with an rms voltmeter calibrated in decibels with an accuracy of ± 0.1 dB over the bandwidth 31.5 Hz to 16 kHz.

7.3 Method

The test film shall be calibrated on a reproducing head made in accordance with ANSI/SMPTE 185.

NOTE – It has been shown that a straight 35 μs curve should be used for maximum use of the magnetic medium. It is recognized, however, that it is necessary for the immediate future to continue to add 3180 μs because some theater equipment is unable to compensate for the low end.

SMPTE RECOMMENDED PRACTICE

RP 163-1992

for Television —
System Service Messages

1 Scope

This practice details and defines the control message subset for the system service level. System service messages are used to perform system functions within a general-purpose communications channel of an interface system. This interface system shall transport data and digital control signals between equipment utilized in the production, post-production, and/or transmission of visual and aural information.

2 Notation

This practice describes the coding of keywords and information fields (I/F) in the form shown below.

NN	KEYWORD or I/F NAME	Keyword or I/F descriptive text
[The coding NN represents the assigned keyword or I/F code in hexadecimal format]		["trib-" Descriptive text: effect of message at tributary.] ["bc-" Descriptive text: effect of message at bus controller.] [Other comments ...]
	Format:	<COMMAND>
		<PARAMETER NAME 0> [Parameter description;
		... Parameter value coding, scale or range;
		<PARAMETER NAME n> Parameter definitions and explanations]

In the practices listed in annex B, keywords are listed numerically in hexadecimal notation. Keyword numbers are reserved as follows:

— Keywords 00_h – $1F_h$: System service subset
— Keywords 20_h – $3F_h$: Common message subset
— Keywords 40_h – FF_h: Virtual machine type-specifc subset

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3 Summary of keywords, mnemonics and information field (I/F) names

Hex	Keyword	(mnemonic)	Hex	I/F name	(mnemonic)
00	SYSTEM SERVICE NO OPERATION	(SNOP)			
01	Reserved for BEGIN	(RBGN)			
02	Reserved for END	(REND)			
03	SYSTEM SERVICE RESET	(SRST)			
04	INITIAL SEGMENT	(ISGT)			
05	SUBSEQUENT SEGMENT	(SSGT)			
06	BLOCK	(BLCK)			
07	VIRTUAL MACHINE/GROUP SELECT	(VMGS)			
08	SYSTEM SERVICE ERROR	(SERR)			
09	VIRTUAL GROUP ATTACH	(VGAT)			
0A	VIRTUAL GROUP DISCONNECT	(VGDT)			
0B					
0C					
0D					
0E					
0F					
10	ASSIGN LINKAGE	(ALNK)	10	LINKAGE	(LINK)
11	DEASSIGN LINKAGE	(DLNK)	11	STATUS	(STAT)
12	ASSIGN SUPERVISORY LEVEL GROUP	(ASGP)	12	SUPERVISORY LEVEL GROUP	(SGRP)
13	DEASSIGN SUPERVISORY LEVEL GROUP	(DSGP)	13	VIRTUAL GROUP	(VGRP)
14	ASSIGN VIRTUAL GROUP	(AVGP)	14		
15	DEASSIGN VIRTUAL GROUP	(DVGP)	15		
16	BC READ	(BCRD)	16		
17	BC I/F ITEM RESPONSE	(BIRE)	17		
18	REQUEST TIME TRANSMISSION	(RQTT)	18		
19	BUS CONTROLLER USER DEFINED	(BCUD)	19		
1A			1A		
1B			1B		
1C			1C		
1D			1D		
1E			1E		
1F	EXTENSION	(SEXT)	FF	EXTENSION	(SIEX)

NOTES –
1 Information field names 03_h – $0F_h$ are reserved.
2 The following convention is used in all messages (system service, common, and type-specific):
– most-significant byte (MSB) is transmitted first;
– least-significant bit (lsb) is transmitted last.

4 Keywords

00 SYSTEM SERVICE NO OPERATION — trib- and bc- System service no operation. Relayed by bc.

Format: <SYSTEM SERVICE NO OPERATION>

01 Reserved for BEGIN
02 Reserved for END — These codes are reserved for BEGIN and END delimiters. They are used in the form:
<BEGIN>
<command or I/F list>
<END>
Relayed by bc.

03 SYSTEM SERVICE RESET — trib- System service reset. Resets all system service level functions to the power-up default state:
Virtual machine select – 0
Virtual groups disconnected
Segmentation off.
bc- Select virtual circuit 0 for the addressed tributary.
Sent by bc.

Format: <SYSTEM SERVICE RESET>

04 INITIAL SEGMENT — trib- Directs the system service level to commence segment assembly.
bc- Do not parse message further.
Relayed by bc.

Format: <INITIAL SEGMENT>
<SEGMENT COUNT> — 8-bit binary unsigned number; count zero is the final segment.
<SEGMENT DATA ...>

NOTE – The final byte of a data segment shall be the final byte of a supervisory level message block.

05 SUBSEQUENT SEGMENT — trib- Directs the system service level to continue segment assembly.
bc- Do not parse message further.
Relayed by bc.

Format: <SUBSEQUENT SEGMENT>
<SEGMENT COUNT> — 8-bit binary unsigned number; count zero is the final segment.
<SEGMENT DATA> ...

NOTES –
1 The final byte of a data segment shall be the final byte of a supervisory level message block.
2 A tributary with multiple virtual machines attached must provide separate segmentation facilities for each virtual machine.

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06 BLOCK — trib- Directs the system service level to disassemble messages which have been concatenated within a single supervisory level message block. The BLOCK command shall be employed to delimit messages on every occasion where message concatenation is employed.
bc- Looks at end of block for system service message.
Relayed by bc.

Format: <BLOCK>
<BYTE COUNT> — 8-bit binary unsigned number. Specifies the length of the individual blocked message, in bytes, not including the byte count.
<BLOCK DATA> ...

07 VIRTUAL MACHINE/GROUP SELECT — trib- Directs the system service level to select the specified virtual machine or group.
bc- Selects the virtual circuit linkage for the indicated virtual machine.

Format: <VIRTUAL MACHINE/GROUP SELECT>
<VIRTUAL MACHINE/GROUP NUMBER> — 8-bit binary unsigned number in the range 00_h – EF_h (machine), $F0_h$ - FF_h (group). 00_h is default.

08 SYSTEM SERVICE ERROR — trib- and bc- Advises that the system service command in the last frame received had not been understood, or could not be performed. Following detection of a SYSTEM SERVICE ERROR condition, no further processing will take place on the supervisory level frame, although any virtual machine message(s) encountered up to that point will still be forwarded to their destinations.
Relayed by bc.

Format: <SYSTEM SERVICE ERROR>
<EXEC CODE> — 8-bits
00 - parse error
01 - cannot do by design
02 - insufficiently equipped
03 - buffer overflow
04 - invalid keyword argument
05 - destination tributary unavailable
<BYTE COUNT> — 8-bits; not including the byte count
<OFFENDING COMMAND>

09 VIRTUAL GROUP ATTACH

trib- Directs the system service level to attach the specified virtual machine to the specified virtual machine group.
bc- Never received.
Sent by bc.

Format: <VIRTUAL GROUP ATTACH>
<VIRTUAL MACHINE NUMBER> 8-bit binary unsigned number in the range 00_h to EF_h. 00_h is default.
<VIRTUAL GROUP NUMBER> 8-bit binary unsigned number in the range $F0_h$ to FF_h only.

0A VIRTUAL GROUP DISCONNECT

trib- Disconnects the specified virtual machine from the specified virtual machine group.
bc- Never received.
Sent by bc.

Format: as VIRTUAL GROUP ATTACH

00_h removes all group assignments for a particular virtual machine.

10 ASSIGN LINKAGE

trib- Never received.
bc- Directs the bus controller system service level to establish a unidirectional linkage.

Format: <ASSIGN LINKAGE>
<SOURCE>
<DESTINATION>

Where SOURCE = Supervisory level select address + virtual machine number (default is 00_h);
and DESTINATION = Supervisory level select address + virtual machine number or virtual group number (default is 00_h)
or DESTINATION = Supervisory level group select address + virtual group number (default is 00_h).

11 DEASSIGN LINKAGE

trib- Never received.
bc- Directs the system service level to terminate the specified unidirectional linkage.

Format: as ASSIGN LINKAGE

12 ASSIGN SUPERVISORY LEVEL GROUP

trib- Never received.
bc- Directs the bus controller to assign a tributary to the designated group.

Format: <ASSIGN SUPERVISORY LEVEL GROUP>
<TRIBUTARY SELECT ADDRESS>
<SUPERVISORY GROUP SELECT ADDRESS>

13 DEASSIGN SUPERVISORY LEVEL GROUP

trib- Never received.
bc- Directs the bus controller to remove a tributary from a designated group.

Format: as ASSIGN SUPERVISORY GROUP

14 ASSIGN VIRTUAL GROUP

trib- Never received.
bc- Directs the bus controller to assign a virtual machine to a virtual group.

Format: <ASSIGN VIRTUAL GROUP>
<MACHINE> Where MACHINE = Tributary select address + virtual machine number.
<VIRTUAL GROUP NUMBER>

15 DEASSIGN VIRTUAL GROUP

trib- Never received.
bc- Directs the bus controller to remove a virtual machine from a virtual group.

Format: as ASSIGN VIRTUAL GROUP

16 BC READ

trib- Never received.
bc- Directs the bus controller to transmit the instantaneous contents of the information field.

Format: <BC READ>
<I/F NAME> Note– The I/F NAME may be replaced by several names wrapped in a BEGIN/END construct.

17 BC I/F ITEM RESPONSE

trib- Contains the I/F data in response to a BC READ command.
bc- Never received.

Format: <BC I/F ITEM RESPONSE>
<I/F NAME> Note– Several I/F NAMES/VALUES may be wrapped in a BEGIN/END construct.
<I/F VALUE>

18 REQUEST TIME TRANSMISSION

trib- Never received.
bc- Directs the bus controller to transmit the value of the master system clock to all virtual machines using the common message TIMELINE RUN.

Format: <REQUEST TIME TRANSMISSION>

19 BUS CONTROLLER USER DEFINED

trib- Never received.
bc- Directs the bus controller to enter the user defined command state. On entry to such a state the specific bus controller parses the data bytes which follow. This will be manufacturer-, operator-, and/or installation-dependent.

Format: <BUS CONTROLLER USER DEFINED>
<BYTE COUNT> 8-bit binary unsigned number. Specifies the length of the command in bytes, not including the byte count itself.
<RAW DATA>

1F EXTENSION

trib- and bc- Directs the tributary or bus controller to enter the extension command set for the following single command only. They shall then resume execution of the basic command set.

Format: <EXTENSION>
<EXTENSION SET COMMAND> (one or more bytes)

5 Information fields

10 LINKAGE

Contains all the linkage information.

Format: <LINKAGE>
<BEGIN>
<SOURCE>
<DESTINATION>
...
<SOURCE>
<DESTINATION>
<END>

Where SOURCE = Supervisory level select address + virtual machine number (default is 00_h):
and DESTINATION = Supervisory level select address + virtual machine number or virtual group number (default is 00_h)
or DESTINATION = Supervisory level group select address + virtual group number (default is 00_h).
When necessary, the linkage information may be segmented.

11 STATUS

Tallies the system service level status.

Format: <STATUS>
<STATUS REPORT>

00_h: Linkage directory established; clock available
01_h: No linkage directory; clock available
10_h: Linkage directory established; no clock available
11_h: No linkage directory; no clock available

12 SUPERVISORY LEVEL GROUP

Contains all active supervisory level (S/L) groups excluding All Call, with the associated tributary addresses.

Format: <SUPERVISORY LEVEL GROUP>
<S/L GROUP IDENTIFIER> 16-bit binary unsigned number.
<BEGIN>
<S/L SELECT ADDRESS> Multiple groups may be nested with BEGIN/END.
...
<S/L SELECT ADDRESS> When necessary, the message may be segmented.
<END>

13 VIRTUAL GROUP

Contains all active virtual groups with the associated virtual machine identifiers.

Format: <VIRTUAL GROUP<
<VIRTUAL GROUP NUMBER> 8-bit binary unsigned number in the range $F0_h$ to EF_h
<BEGIN>
<Supervisory level select address>
<VIRTUAL MACHINE NUMBER> 8-bit binary unsigned number in the range 00_h to FF_h
...
<Supervisory level select address> Multiple groups may be nested with BEGIN/END.
<VIRTUAL MACHINE NUMBER> When necessary, the message may be segmented.
<END>

FF EXTENSION

Indicates that the next information field name is a member of the extension set.

Format: <EXTENSION>
<EXTENSION SET I/F NAME>

Annex A (informative)
General concepts

The following text contains a general explanation of some of the concepts used in the formulation of the system service message set. It constitutes tutorial information and is intended to assist in the understanding of the specifications in previous portions of this practice.

A.1 System service tasks

System service messages can affect all participants on the bus, tributaries as well as the bus controller. their effect, however, differs between tributaries and the bus controller.

Some system service messages address the bus controller only. These originate in a tributary and cause the bus controller to set up a new internal condition, or to originate further messages. Examples:

ASSIGN LINKAGE
DEASSIGN LINKAGE
ASSIGN SUPERVISORY LEVEL GROUP
DEASSIGN SUPERVISORY LEVEL GROUP
ASSIGN VIRTUAL GROUP
DEASSIGN VIRTUAL GROUP

Other system service messages are sent by the bus controller to accomplish linkage tasks in tributaries. Examples:

VIRTUAL GROUP ATTACH
VIRTUAL GROUP DISCONNECT
VIRTUAL MACHINE/GROUP SELECT

Finally there are system service messages which accompany virtual machine messages from source to destination and have no practical effect on the bus controller. These are simply relayed by the bus controller. Examples:

BLOCK
INITIAL SEGMENT
SUBSEQUENT SEGMENT

Notes in the system service message list indicate the effect of the messages on the tributary and the bus controller respectively, and give detailed information about their effect.

A.2 Blocking and segmenting

Information about blocking and segmenting of virtual machine messages by the use of the corresponding system service messages is given in SMPTE RP 139.

A.3 Addressing virtual machines

Since more than one virtual machine logically may be connected to a tributary, the address of every virtual machine is in two parts:

- the tributary address;
- the virtual machine number which identifies the virtual machine connected to this tributary.

Messages which specify a virtual machine must carry both tributary address and virtual machine number as joint parameters. When a single virtual machine only is attached to a tributary address, the virtual machine number defaults to zero (00_h).

A.4 Assigning linkages

In order to establish a linkage it is necessary to make an entry in the linkage directory of the bus controller. Unless the bus controller is very simple (setting up linkages by thumbwheels or a local keyboard only), system service messages originating in any tributary may be used to establish a linkage entry.

The relevant messages are:

ASSIGN LINKAGE and DEASSIGN LINKAGE

Either message carries parameters which specify the tributary address and virtual machine number of both source and destination; each such message assigns/deassigns a unidirectional linkage only, from one source to one destination.

In the assignment of groups the tributary address may be replaced by a supervisory level group address, and/or the virtual machine number may be replaced by a virtual group number.

Application details and examples of tributary linkage are given in SMPTE RP 139.

The linkage of groups is described below.

A.5 Assigning groups

The operational requirement for the grouping of virtual machines may come from any individual tributary, or from an assignment virtual machine. However, only the bus controller is able to establish groups, and system service messages are required, therefore, to instruct the bus controller to take the necessary actions.

A.6 Supervisory level groups

In order to set up a controlled supervisory level group, two actions need to be taken by the assigning virtual machine:

- direct the bus controller to assign a linkage between the controlling virtual machine and the newly defined supervisory group;
- direct the bus controller to assign all tributaries that are to be members of the new group.

Linkage assignment is initiated by an ASSIGN LINKAGE message to the bus controller as described above, but using the desired supervisory level group address and virtual group number instead of a tributary address and virtual machine number.

Where a single virtual machine only is attached to each and every tributary within a supervisory level group, the virtual group number defaults to zero (00_h).

Assignment of the required tributaries to the group is initiated by multiple system service messages, using the command

ASSIGN SUPERVISORY LEVEL GROUP

to the bus controller. In reaction to each of these messages the bus controller generates a supervisory level GROUP ASSIGN message for the appropriate tributary.

The ASSIGN SUPERVISORY LEVEL GROUP message carries two parameters:

- the tributary select address, which identifies the appropriate tributary.
- the desired supervisory level group select address.

Deassignment is performed similarly using the messages:

DEASSIGN LINKAGE and
DEASSIGN SUPERVISORY LEVEL GROUP.

A.7 Virtual groups

In order to set up a controlled virtual group, two actions need be taken by the assigning virtual machine:

- direct the bus controller to assign a linkage between the controlling virtual machine and the newly defined virtual group;
- direct the bus controller to assign all virtual machines that are to be members of the new group.

Linkage assignment is initiated by an ASSIGN LINKAGE message to the bus controller as described above, but using the desired virtual group number instead of the virtual machine number following the tributary supervisory level SELECT or GROUP address.

Assignment of the required virtual machines to the group is initiated by multiple system service messages using the command ASSIGN VIRTUAL GROUP to the bus controller.

In reaction to each of these messages the bus controller generates the system service message VIRTUAL GROUP ATTACH and sends it to the system service level of the tributary serving the required virtual machine.

Where a virtual group comprises virtual machines spread across several tributaries, it is the responsibility of the assigning station to direct the bus controller to construct the appropriate supervisory level group using the ASSIGN SUPERVISORY LEVEL GROUP command.

Each ASSIGN VIRTUAL GROUP message carries the parameters:

- the tributary select address and virtual machine number of the virtual machine;
- the desired virtual group number.

Deassignment is performed similarly using the messages DEASSIGN LINKAGE and DEASSIGN VIRTUAL GROUP. The message used by the bus controller to cancel the group assignment of an individual virtual machine is VIRTUAL GROUP DISCONNECT.

A.8 Assignment messages overview

Tables A.1 and A.2 summarize all system service messages which are used for assigning/deassigning linkages and groups, along with their parameters and their effects.

Table A.1 — Messages to the bus controller

Message	Parameters		Action by bus controller
ASSIGN/DEASSIGN LINKAGE	Source	tributary address virtual machine number	Set up internal linkage directory
	Destination	tributary address/group address virtual machine number virtual group number	
ASSIGN/DEASSIGN SUPERVISORY LEVEL GROUP	Tributary address		Send supervisory level GROUP ASSIGN/DEASSIGN to appropriate tributary
	Supervisory level group address		

Table A.2 – Messages from the bus controller

Message	Parameters	Action by tributary
VIRTUAL GROUP ATTACH/ DISCONNECT	Virtual machine number Virtual group number	Commence/cease to react to messages for the specified virtual group number